$\%_{tot} = \frac{E_R}{E_F}$ → percentuale energie assorbite

E_R: $Q = \% : 100$

$Q = m \cdot s \cdot \Delta T$ [s = calore spec. H_2O $= 4{,}184 \frac{J}{g \cdot °C}$]

$E_F = \frac{h \cdot c}{\lambda}$ [$h = 6{,}63 \cdot 10^{-34}$ J/s; $c = 3 \cdot 10^{17}$ nm/s]

$\Delta H = \Delta E = E_F = \frac{E_{TOT}}{N_A}$ [$N_A = 6{,}02 \cdot 10^{23}$]

Resa reazione % $= \frac{\text{N moli effettive}}{\text{N moli previste}} \cdot 100$

$E = R_H \left(\frac{1}{n_f^2} - \frac{1}{n_i^2} \right)$ [$R_H = 2{,}18 \cdot 10^{-18}$ J]

$I = \frac{Q}{t} \Big| Q = It$ [$F = 96500 \frac{J}{V \cdot mol}$]

$Q = n_e \cdot F$

$\Delta G° = -RT \ln K$ [$R = 8{,}314 \frac{J}{K \cdot mol}$] → punto di equilibrio quindi $K_p = K_{ps}$

$\Delta G = \Delta G° + RT \ln Q$ $\Delta G° = -nFE°_{cell}$ ⟹ $E°_{cell} = \frac{RT}{nF} \ln K_c$

% peso $= \frac{\text{massa soluto}}{\text{massa soluzione}} \cdot 100$

$\Delta G_R = \Delta H - T\Delta S$

$E = E° - \frac{0{,}059}{n} \log Q$

$\Delta G° = \Delta H° - T\Delta S°$

$1\,l \cdot 1\,atm = 101{,}32\,J$

$2H^+ + 2e^- \rightarrow H_2$ $E° = 0$

$Q > K_{ps}$ si precipitato

$\Delta G° = -nFE°_{cell}$

$\Delta G° = -RT \ln K$

$E°_{cell} = \frac{0{,}059}{n} \log K = \frac{RT}{nF} \ln K$

$E°_{cell} > 0$ reazione vs destra

$E°_{cell} < 0$ reazione vs sinistra

Reazione inverse $E°$ cambia segno

$\Delta G < 0$ reaz. spont. destra

$\Delta G > 0$ reaz. spont. sinistra

$Q > K_p$ verso sinistra

$Q < K$ verso destra

$Q > K_{ps}$ precipitato

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14/06/2013 continua...

(14) DATI
$T = 25°C = 298K$
$Fe(OH)_3$
$pH = 11,2$
$K_{ps} = 2,6 \cdot 10^{-39}$

INC.
$E = -0,63\ V$

$Fe^{3+} + 3e^- = Fe \qquad E° = -0,04\ V$

$Fe(OH)_3 \longrightarrow Fe^{3+} + 3OH^-$

$pOH = 14 - pH = 2,8$

$[OH^-] = 10^{-2,8} = 1,585 \cdot 10^{-3}\ M$

$K_{ps} = [Fe^{3+}][OH^-]^3$

$[Fe^{3+}] = \frac{K_{ps}}{[OH^-]^3} = 6,53 \cdot 10^{-31}$

$Fe(OH)_3 \longrightarrow$	Fe^{3+}	$+ 3OH^-$
x	0	$1,585 \cdot 10^{-3}$
$-x$	$+x$	$+3x$
0	x	$1,585 \cdot 10^{-3} + 3x$

$K_{ps} = \frac{[5,283 \cdot 10^{-4}][1,585 \cdot 10^{-3}]^3}{(y - 5,283 \cdot 10^{-4})} = 2,6 \cdot 10^{-39} \Rightarrow$

oppure fai così

$\Rightarrow y = 8,091 \cdot 10^{26} \qquad [Fe(OH)_3] = 8,708 \cdot 10^{26}$

$E = E_0 - \frac{0,059}{n} \cdot \log\left[\frac{[OH^-]^3[Fe]}{[Fe(OH)_3]}\right] =$

$K_{ps} = (1,585 \cdot 10^{-3} + 3x)^3 x = 2,6 \cdot 10^{-39} \Rightarrow$

$\Rightarrow x = \frac{2,6 \cdot 10^{-39}}{1,585 \cdot 10^{-3}} = 6,529 \cdot 10^{-31}$

$E = E^0 - \frac{0,0059}{n} \cdot \log Q = \left[\frac{[Fe(s)]}{[Fe^{3+}]} \to 1\right] = -0,04 - \frac{0,0059}{3} \cdot \log\left(\frac{1}{6,529 \cdot 10^{-31}}\right) =$ ($\frac{1}{[Fe^{3+}]}$)

$= -0,04\ V - \left(\frac{0,0059}{3} \cdot 30,1851\right) = -0,63\ V$

(15) DATI
$V = 20\ l$
$m_{NO_2} = 100\ g$
$n_{N_2O_4} = 0,80\ mol$

$n_{NO_2} = \frac{100\ g}{(14+32)\ g/mol} = 2,17\ mol$

INC.
$K_c =$

$0 + X = 0,80 \to X = 0,80$

moli	$2NO_2 \longrightarrow$	N_2O_4
	2,17	0
	$-2x$	$+x$
	$2,17 - 2x$	0,80 mol

$n_{NO_2}^{eq} = 2,17 - 1,6 = 0,57 mol$

$[NO_2]_{eq} = \frac{0,57 mol}{20 l} = 0,0285\ M$

$[N_2O_4]_{eq} = \frac{0,80 mol}{20 l} = 0,04\ M$

$K_C = \frac{[N_2O_4]}{[NO_2]^2} = \frac{0,04}{(0,0285)^2} = 49,24$

(16) $m = 6 \qquad l = 0, 1, 2, 3, 4, 5 \qquad [m_l = 0, \dots, m-1]$

$m_{l_0} = 2l+1 = 1$
$m_{l_1} = 2l+1 = 3$
$m_{l_2} = 2l+1 = 5$
$m_{l_3} = 2l+1 = 7$
$m_{l_4} = 2l+1 = 9$
$m_{l_5} = 2l+1 = 11$

Numero totale di orbitali è:
$1+3+5+7+9+11 = 36$.
E ogni orbitale ospita 2 elettroni:
$2 \cdot 36 = \boxed{72 e^-}$ totali

(17) DATI

$m_{H_2O} = 300 g$
$\lambda = 1,06 \cdot 10^4\ nm$ laser CO_2
$T = 5,00\ °C$
$s = 4,184\ J/g \cdot °C$
$h = 6,63 \cdot 10^{-34}\ J \cdot s$

$c = 3 \cdot 10^8\ m/s$
$c = 3 \cdot 10^8 \cdot 10^9\ nm/s = 3 \cdot 10^{17}\ nm/s$

INC.
#g =

$\lambda = 1,06 \cdot 10^{-5}\ m$

$\#_{fotoni} = \frac{E_{richiesta}}{E_{fotoni}}$

$E_R = \frac{q}{\%\ energia\ assorbita} = \frac{6276 J}{1} = 6276 J$

$E_R \quad q = \% \cdot 100$

$q = m \cdot s \cdot \Delta T = 300 g \cdot 4,184 \frac{J}{g °C} \cdot 5,00\ °C = 6276 J$

$E_{fotoni} = \frac{h \cdot c}{\lambda} = 6,63 \cdot 10^{-34} J \cdot s \cdot 3 \cdot 10^8 \frac{m}{s} \cdot \frac{1}{1,06 \cdot 10^{-5}\ m} =$

$= 1,876 \cdot 10^{-20}\ J$

$\#_{fotoni} = \frac{6276 J}{1,876 \cdot 10^{-20} J} = 3,34 \cdot 10^{23}$

$1s\ 2s\ 2p\ 3s\ 3p\ 4s$

(18) Comportamento paramagnetico: Il litio ha questo comportamento.

(19) DATI
$K_{PS} = 7,2 \cdot 10^{-13}$
$[CaBr_2] = 0,10 M$

cioè quanto AgB_2 si dissocia → Solub. $[AgB_2] = 3,85 \cdot 10^{-12}$ INC

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$CaBr_2 \longrightarrow Ca^{2+} + 2Br^-$ $\quad [Br^-] = 2[CaBr_2] = 0{,}2\,M$

	$AgBr \longrightarrow Ag^+ + Br^-$		
		0	$0{,}2\,M$
	$-s$	$+s$	$+s$
		s	$0{,}2+s$

$K_{ps} = [Ag^+][Br^-] = s(0{,}2+s) \sim s\cdot 0{,}2 = 7{,}7\cdot 10^{-13} \Rightarrow s = 3{,}85\cdot 10^{-12}$

4/07/2013

① DATI
$[CH_3COOH] = 1\,M$
$[CH_3COONa] = 1\,M$
$n_{HCl} = 0{,}2\,mol$
$V = 1\,l$
$K_a = 1{,}8\cdot 10^{-5}$

Velocemente:

	$CH_3COOH \longrightarrow$	CH_3COO^-	$+ H^+$	INC.
	1	1	0,2	$pH = 4{,}56$
	$+0{,}2$	$-0{,}2$	$-0{,}2$	
	1,2	0,8	0	

$pH = pK_a + \log\frac{0{,}8}{1{,}2} = 4{,}74 + (-0{,}18) = 4{,}56$

$CH_3COOH \longrightarrow CH_3COO^- + H^+$
$CH_3COONa \longrightarrow CH_3COO^- + Na^+$

	$CH_3COOH \longrightarrow$	CH_3COO^-	$+ H^+$
	1 M	1 M	0
	$-x$	$+x$	$+x$
	$1-x$	$1+x$	x

$K_a = \frac{(1+x)x}{(1-x)} \sim x \Rightarrow [H^+] = 1{,}8\cdot 10^{-5}$

$pH_I = -\log(1{,}8\cdot 10^{-5}) = 4{,}74$

$HCl \longrightarrow H^+ + Cl^-$ $\qquad n_{H^+} = 0{,}2$

$n_{CH_3COO^-} = (1 + 1{,}8\cdot 10^{-5})\,\frac{mol}{l}\cdot 1\,l = 1{,}000018\,mol$

$n_{CH_3COOH} = (1 - 1{,}8\cdot 10^{-5})\,\frac{mol}{l}\cdot 1\,l = 0{,}999982\,mol$

mol	$CH_3COOH \longrightarrow$	CH_3COO^-	$+ H^+$
	0,999982	1,000018	0,2
	$+0{,}2$	$-0{,}2$	$-0{,}2$
	1,199982	0,800018	0

$[CH_3COOH] = 1{,}199982\,M$ $\qquad [CH_3COO^-] = 0{,}800018$

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